

MULTIMEDIA



UNIVERSITY

STUDENT ID NO

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MULTIMEDIA UNIVERSITY

FINAL EXAMINATION

TRIMESTER 1, 2015 / 2016

**TCP2651 – CONCEPTS OF PROGRAMMING LANGUAGES
/ TCP2411 – PROGRAMMING LANGUAGE CONCEPTS**

(All sections / Groups)

16 OCTOBER 2015
9:00 a.m. – 11:00 a.m.
(2 Hours)

INSTRUCTIONS TO STUDENTS

1. This Question paper consists of **5 pages** only including the cover page with 4 Questions.
 2. Attempt **ALL** questions. All questions carry equal marks and the distribution of the marks for each question is given.
 3. Please write all your answers **CLEARLY** in the Answer Booklet provided.
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Question 1 (5+4+4+2 marks)

- (a) Briefly explain from the programmer perspective each of the following reasons for studying concepts of programming languages.
- Increased capacity to express ideas
 - Improved background for choosing appropriate languages
 - Increased ability to learn new languages
 - Better understanding of the implementation of concepts
 - Overall advancement of computing
- (b) Consider the following program which finds the area of the triangle using the formula " $0.5 \times \text{base} \times \text{height}$ ".

```
#include<iostream>
using namespace std;
int main()
{
    double a=3.0, b=4.0, ab, c;
    ab = a * b;
    c = 1/2.0 * ab;
    cout << "Area of triangle is " << c << endl;
    return 0;
}
```

The above program is not readable. What are the FOUR essential qualities of a readable program?

- (c) Explain FOUR criteria used in evaluating the cost of a programming language.
- (d) How does the support for exception handling contribute to the reliability of a language?

Continued.....

Question 2 (3+2+4+6 marks)

- (a) Can a syntactically correct statement be semantically wrong? Provide an example to support your answer.
- (b) What is EBNF often used for in computer science?
- (c) Draw the syntax graph for the following EBNF.
 $\langle \text{if_stmt} \rangle \rightarrow \text{if } (\langle \text{logic_expr} \rangle) \langle \text{stmt} \rangle \{ \text{else if } \langle \text{stmt} \rangle \} [\text{else } \langle \text{stmt} \rangle]$
- (d) Given the following context-free grammar of a language.

$$S \rightarrow aSa \mid bSb \mid \epsilon$$

- i. The above grammar G of a language is defined by the four-tuple, $G = (T, N, S, P)$. List down what T , N , S , and P are.
- ii. Show that $aabbba$ is a valid sentence of this grammar using derivation.
- iii. Show that $bbaabb$ is a valid sentence of this grammar using parse tree.
- iv. Describe the language generated by this grammar.

Continued.....

Question 3 (2+4+4+5 marks)

- (a) What are the TWO disadvantages of dynamic type binding?
- (b) Explain with an example in C++ what an explicit heap-dynamic variable is.
- (c) What are the TWO most important design issues that are specific to character string data types? In your answer, compare two different programming languages for each design issue.
- (d) Give an example in C for each of the following expressions.
 - i. Arithmetic expression
 - ii. Conditional expression
 - iii. Relational expression
 - iv. Boolean expression
 - v. Assignment expression

Continued.....

Question 4 (3+3+2+1+6 marks)

- (a) What are the THREE design issues for two-way selectors? In your answer, compare two different programming languages for each design issue.
- (b) Translate the pseudocode below of a for-loop to C++ using a while-loop.
- ```
for(int i = 0; i < 10; i++)
 print i
```
- (c) What is a subprogram?
- (d) What is the concept behind subprograms?
- (e) Consider the program below. The line numbers at the left are shown only for reference.

```
1 #include <iostream>
2 using namespace std;
3 void odd(int x);
4 int main()
5 {
6 int i;
7 do {
8 cout << "Enter number (0 to exit): ";
9 cin >> i;
10 odd(i);
11 } while(i!=0);
12 return 0;
13 }
14 void odd(int x)
15 {
16 if ((x%2)!=0) cout << "It is odd.\n";
17 else cout << "It is even.\n";
18 }
```

Identify the correct code segment from the above program for each of the following:

- i. Subprogram definition
- ii. Subprogram header
- iii. Subprogram call
- iv. Prototype
- v. Formal parameter
- vi. Argument

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